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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,333	05/11/2001	Brian S. Medower		7661

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EXAMINER

ANGEBRANNDT, MARTIN J

ART UNIT PAPER NUMBER

1756

DATE MAILED: 05/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/854,333

Applicant(s)

MEDOWER ET AL.

Examiner

Martin J. Angebrannt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. The response of the applicant has been read and given careful consideration. Responses to the arguments of the applicant are presented after the first rejection to which they are directed. Rejections of the previous office action, not repeated below are withdrawn based upon the arguments and amendment to the claims.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1,3-13 and 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,960,680 A (PAN et al.) in view of EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD), JP 03-086943 A (ASAHI CHEM IND CO LTD), Phillips et al. '360, Uno et al. '690, Zhou et al. '822 and Handa et al. '507.

US 4,960,680 A (PAN et al.) teaches SnSbIn phase change optical recording media. The upper side of the recording layer (42) in figure 2 is shown to have a protective overcoat (41). The recording layer material may be coated by sputtering or evaporation (column 5/lines 43-54). Example 1 uses a 80 nm thick SnSbIn recording layer. (column 6). Example 3 uses 100 nm thick recording layer coatings (column 7). There is a sample in the table in column 9, which corresponds to $Sb_{70}Sn_{15}In_{15}$.

EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD) teaches that silicon oxynitride (SiON) and silicon dioxide are known protective layer materials [0020]. These are disclosed as useful as crystallization acceleration layers as well [0030]. The thickness of the upper crystallization acceleration layers may be 10 to 80 nm. [0050]. The thickness of the

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protective layers allows the adjustment of the absorption and difference in the reflectance (between the recorded and unrecorded areas) to be adjusted (this is contrast) [0006].

JP 03-086943 A (ASAHI CHEM IND CO LTD) teaches the provision of silicon oxynitride protective layers over optical recording media (abstract). This is described as having good water/moisture barrier properties, good mechanical strength, good chemical stability and resistance to peeling or cracking (abstract). The use of phase change optical recording media, including Se and Te is described in the upper left column of page 2. Useful thicknesses appear in the examples and include 80 nm (page 6, lower left column), 35 nm (example 2, page 6/upper right column)

Phillips et al. '360 teaches optical recording media which use dielectric layers having antireflective thicknesses to more actively couple the light into the recording layer and optimize the reflectivity of the recording medium. The optical thicknesses are less than the quarter wavelength thicknesses generally assumed due to the presence of the adjacent metallic recording layer (3/62-5/4). The use of optical recording layers comprising at least 5% of two of Cd, **In**, **Sn**, **Sb**, Pb, Bi, Mg, Cu, **Al**, **Zn** and Ag is taught. The thickness of the upper protective layer is optimized to achieve the desired reflectivity (2/44-65, 3/63-24).

Uno et al. '690 teaches the equivalence of the use of SiON and other dielectrics in protective layers and the use of these materials to adjust the optical characteristics of the recording medium. (5/59-67).

Zhou et al. '822 teach phase change optical recording media, the thickness of the dielectric layer between the substrate and the recording layer (ie the light incident side) does not affect the cyclability (cooling rate) of the recording medium. This layer protects the recording

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layer from humidity, the substrate from thermal damage and is optimized for contrast. The thickness may be between 15 and 180 nm. (3/33-45).

Handa et al. '507 teach that the lower dielectric layer, on light incident side, prevents the oxidation of the recording layer and thermal damage to the substrate. The thickness may be 50-300 nm. The thickness of the dielectric layer on the light incident side of the recording layer may be determined so that the reflectivity difference between the amorphous and crystalline states in a phase change optical recording medium is maximized. (8/53-9/3).

It would have been obvious to one skilled in the art to modify the invention of US 4,960,680 A (PAN et al.) by providing a protective layer coating as disclosed in figure 2 of that reference and to use known protective layer materials such as the SiON taught by of EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD) and JP 03-086943 A (ASAHI CHEM IND CO LTD) with a reasonable expectation of gaining the protective effects described by JP 03-086943 A (ASAHI CHEM IND CO LTD) and the additional advantages of an acceleration in the speed of transformation from the amorphous to the crystalline state as disclosed by EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD) and further it would have been obvious to optimize the thickness of the lower SiON layer to more effectively couple the light into the recording layer as taught by Phillips et al. '360 and to optimize the contrast (reflectivity difference) between the amorphous and crystalline states as taught by Uno et al. '690, Zhou et al. '822 and Handa et al. '507 with a reasonable expectation of realizing these goals as is known for the laser incident side of the media.

The addition of Zhou et al. '822 and Handa et al. '507 address the optimization of the dielectric layer thickness on the side of the medium upon which the laser is incident to optimize

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contrast. In the case of Zhou et al. '822 and Handa et al. '507, this is the layer between the substrate and the recording layer, but it is clear to one of ordinary skill in the art that the optimization for proper contrast would apply to the dielectric layers on the laser incident side of the recording layer. **The sharpening of the fringe shown in figure 6B with increasing refractive index, may be attributable to the refractive index mismatch which would increase the reflectance, but the increase in the contrast due to the change in refractive index is not. This seems to be related to the data in figure 6A. The optimization of both the refractive index and the thickness to maximize contrast seems to yield particularly advantageous results. The applicant may wish to include these limitations in the claims.**

In response to the arguments of the applicant filed 2/17/2006, the applicant argues that the recording layer does not need protection from oxidation. This is not that case as evidenced by section [0027], which discusses native oxide formation of the recording layer. The ability to vary the refractive index over a wide range is a benefit of using SiON rather than SiN or SiO. It would seem that the use of SiON allows the formation of the native oxide, where this would not be the case with SiN. The applicant may wish to comment on any benefit of this. It is not clear if the fringe is sharper as the refractive index increases and if it is sharper for Si₃N₄ than for the SiON. What is the effect of the addition of the nitrogen beyond the increased flexibility in controlling the refractive index. ? It seems clear that the thickness of the dielectric layer on the light incident side allows the contrast to be controlled. The choice of materials and thickness may be more of an advantage in the process due to the flexibility in the introduction of gasses. The rejection stands.

4. Claim 1,3-6,8-13,15-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being

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unpatentable over **either of** US 4,774,170 A (PAN et al.), US 4,812,386 A (PAN et al.) or US 4,798,785 A (PAN et al.), in view of EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD), JP 03-086943 A (ASAHI CHEM IND CO LTD), Phillips et al. '360, Uno et al. '690, Zhou et al. '822 and Handa et al. '507.

US 4,774,170 A (PAN et al.) teaches SnSbZn phase change optical recording media. The upper side of the recording layer (42) in figure 2 is shown to have a protective overcoat (41). The recording layer material may be coated by sputtering or evaporation (column 4/lines 39-50). Example 1 uses a 80 nm thick SnSbZn recording layer. (column 4). Example 3 uses 100 nm thick recording layer coatings (column 5).

US 4,812,386 A (PAN et al.) teaches SnSbGe phase change optical recording media. The upper side of the recording layer (42) in figure 2 is shown to have a protective overcoat (41). The recording layer material may be coated by sputtering or evaporation (column 5/lines 15-26). Example 1 uses a 80 nm thick SnSbGe recording layer. (column 5). Example 3 uses 100 nm thick recording layer coatings (column 6).

US 4,798,785 A (PAN et al.) teaches SnSbAl phase change optical recording media. The upper side of the recording layer (42) in figure 2 is shown to have a protective overcoat (41). The recording layer material may be coated by sputtering or evaporation (column 4/lines 55-66). Example 1 uses a 80 nm thick SnSbZn recording layer. (column 5). Example 3 uses 100 nm thick recording layer coatings (column 6).

It would have been obvious to one skilled in the art to modify the invention of **either of** US 4,774,170 A (PAN et al.), US 4,812,386 A (PAN et al.) or US 4,798,785 A (PAN et al.) by providing a protective layer coating as disclosed in figure 2 of that reference and to use known

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protective layer materials such as the SiON taught by of EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD) and JP 03-086943 A (ASAHI CHEM IND CO LTD) with a reasonable expectation of gaining the protective effects described by JP 03-086943 A (ASAHI CHEM IND CO LTD) and the additional advantages of an acceleration in the speed of transformation from the amorphous to the crystalline state as disclosed by EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD)) and further it would have been obvious to optimize the thickness of the lower SiON layer to more effectively couple the light into the recording layer as taught by Phillips et al. '360 and to optimize the contrast (reflectivity difference) between the amorphous and crystalline states as taught by Uno et al. '690, Zhou et al. '822 and Handa et al. '507 with a reasonable expectation of realizing these goals.

The rejection stands for the reasons above as no further arguments were directed at this line of rejection.

5. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over **either of** US 4,960,680 A (PAN et al.), US 4,774,170 A (PAN et al.), US 4,812,386 A (PAN et al.) or US 4,798,785 A (PAN et al.), in view of EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD), JP 03-086943 A (ASAHI CHEM IND CO LTD), Phillips et al. '360, Uno et al. '690, Zhou et al. '822 and Handa et al. '507, and further in view of US 5,972,459 A (KAWAKUBO et al.).

US 5,972,459 A (KAWAKUBO et al.) teaches a variety of different structures for optical recording media in figures 16-23. Figure 23 shows an embodiment where a central substrate is used and two recording layers are provided, one on each side, effectively doubling the recording capacity. (column 13/line 59-column 14/line 19). The use of phase change recording layers is

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specifically taught in column 12 at lines 13-20.

In addition to the basis provided above, it would have been obvious to one skilled in the art to modify the invention of over either of over US 4,960,680 A (PAN et al.) , US 4,774,170 A (PAN et al.), US 4,812,386 A (PAN et al.) or US 4,798,785 A (PAN et al.), in view of EP 0945860 A (MATSUSHITA ELECTRIC INDUSTRIAL CO LTD) and JP 03-086943 A (ASAHI CHEM IND CO LTD) by providing each side of the substrate t with a recording layer to double the capacity of the medium based upon the teachings of US 5,972,459 A (KAWAKUBO et al.).

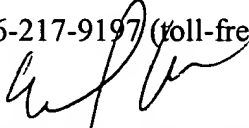
The rejection stands for the reasoning above as no further arguments were directed at this rejection.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebrannndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Martin J. Angebrannt
Primary Examiner
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04/26/2006